PROJECT STATEMENT

STATE: **DELAWARE** GRANT: **W35R-11**

GRANT TITLE: **WILDIFE INVESTIGATIONS – WHITE-TAILED DEER**

JOB SCHEDULE: **OCTOBER 1, 2010 – SEPTEMBER 30, 2011**

STATE: Delaware

GRANT NUMBER AND TITLE:

W 35 R – Wildlife Investigations: White-tailed Deer

OBJECTIVE:

To maintain a healthy and viable deer herd and minimize human/deer conflicts.

JOB NUMBER AND TITLE:

Job 1. White-tailed Deer Mortality Evaluation

JOB OBJECTIVES:

To determine the number of deer harvested, harvest distribution, general health and condition of the herd and age and sex ratios.

To evaluate road kill and other non-hunting mortality.

ACTIVITY:

The 2010/11 deer season provided hunters with 131 days of hunting opportunity beginning September 1, 2010 and ending January 31, 2011. Archery hunters were allowed to hunt during this entire period, excluding Sundays. Muzzleloader hunters had an 8-day October season and a 6-day January season, but were also allowed to use that weapon during the designated shotgun seasons. Shotgun hunters had an 8-day November season and a 7-day January season as well as an 8-day October antlerless and 7-day December antlerless deer season. Furthermore, handgun hunters had a 7-day season in January but could also use these firearms during any of the shotgun deer season. Additionally, youth hunters had a 1-day special hunt in the Saturday preceding the first Saturday of the November Shotgun Season. All seasons were open statewide.

License and tagging requirements were again gender specific in Delaware during the 2010/11 season. Only antlerless deer could be taken on the general hunting license tags and 2 of those had to be females (does). A Hunter's Choice combination tag and a Quality Buck tag could be purchased (1 set/hunter) by Delaware residents for $10. A Hunter's Choice tag allows a hunter to take 1 deer of their choice (antlered or antlerless) and the Quality Buck tag could be used to tag a buck with a minimum outside antler spread of at least 15 inches. For $25 each, non-residents could purchase an antlered deer tag (could be used on a buck with antlers of any size) as well as a separate Quality Buck tag. The purpose of the Quality Buck tag is to allow hunters to take a second antlered buck without putting additional pressure on yearling males. Additional antlerless deer tags were also available for hunters to purchase for $10 each. In areas with significant crop damage, hunters could use special antlerless deer damage tags on lands enrolled in either the Delaware Deer Damage Assistance Program (DDAP) or the Delaware Severe Deer Damage Assistance Program (SDDAP).

Beginning several years ago, private businesses throughout the state were not available to register hunter harvested deer. All deer were required to be registered by hunters using the free phone or internet registration systems. This change was made for three reasons; financial

savings, time savings from not having to enter the previously collected handwritten harvest information into a computer; and the desire for acquisition of nearly instantaneous harvest data. Throughout the year, deer killed by motor vehicles were tagged and reported by state or county police and/or Division field personnel. Furthermore, the Delaware Department of Transportation (DelDOT) recorded the number of deer they removed from roadways.

The data provided by hunters through the electronic registration system provides general harvest information (e.g. harvest location, deer gender, type of tag, and weapon used), but not detailed biological information (e.g. age, field dressed weights, and antler measurements), which is important when trying to evaluate the health and composition of the herd. Therefore, the Division has established biological harvest data collection stations at deer processors across the state and periodically collects this biological data every few years. During the 2010/11 season, no biological was collected.

TARGET DATE:

September 30, 2011

STATUS:

On schedule

REMARKS:

Deer Harvest Mortality Evaluation

The 2010/11 overall deer season resulted in a reported 3rd all-time harvest of 14,183 animals. This was an increase of 14.4% from the 2009/10 season (12,400 deer). This increase was likely the result of a depressed harvest in 2009/2010 caused by unfavorable weather conditions during the season which led to fewer deer being harvested and subsequently more animals surviving through to the 2010/11 season. During the 2009/10 season 2 nor'easter storms struck Delaware during the two most popular and productive seasons (October Muzzleloader and November Shotgun). These storms dumped so much rain on The First State that hunter effort was drastically reduced, which subsequently resulted in reduced harvests. Additionally, Delaware experienced severely unusual snowfall amounts in January 2010, which further inhibited hunter effort during the later part of the season. In regards to effort concerning the number of licensed hunters, there were approximately 16,000 hunters that pursued white-tailed deer during the 2010/11 season. This number of hunters in Delaware has remained relatively constant in recent years.

The 2010/11 season was Delaware's inaugural crossbow season. The crossbow season ran concurrently with the regular archery season from September 1st through January 31st and was open to all hunters, statewide. Previously, Delaware hunters could only use a crossbow during the shotgun deer seasons, if they received a disability permit from the Division or to harvest antlerless deer on farms enrolled in a crop damage assistance program. Throughout the season, hunters managed to harvest 532 deer using a crossbow, 1,758 using a compound, and 60 using a recurve or longbow.

Beginning this season, Delaware was divided into 18 deer management zones (DMZ) (Figure 1) instead of 17. DMZ 1 was split into two zones 1A and 1B. This change was made necessary by the substantial difference in landscape composition of the upper and lower half of this zone. The upper half of this zone is much more urbanized than the lower half and thus the

deer hunting effort is reduced due to safety zones making much of the deer habitat inaccessible to hunters. With this split, the Division is better able to track hunter effort and deer harvest rates inside the more urbanized areas of Zone 1A. Statewide, the deer harvest is analyzed on a zone basis. Harvest by deer management zone for the 2009/10 and 2010/11 seasons is shown in Table 1. Public lands accounted for 1,919 harvested deer (Table 2), 13.5% of the total statewide harvest, which is an increase of 0.1% over the previous season.

In addition to the standard license tags, Delaware has five special tags which hunters can use to harvest extra deer ($10 antlerless tags, quality buck tags, hunter's choice tags, non-resident buck tags, and antlerless deer damage tags). Deer taken on these special tags made up 44% of the total harvest during the 2010/11 season (Figure 2).

A key element of successful deer management is the management of the female portion of the population. Careful regulation of the doe harvest can allow herd size to increase, decrease, or remain stable. From 1954 to 1995, Delaware maintained an either sex deer hunting option with no restrictions. During the late 1970's, and throughout the 1980's the percentage does in the harvest fluctuated between 30 – 40%, with a noticeable declining trend between 1983 through 1988. During these years however, the overall deer harvest increased steadily, as did complaints regarding crop damage and destruction of landscaping in suburban areas. In 1990, the Delaware General Assembly passed legislation allowing the Division of Fish and Wildlife to sell special antlerless deer tags for use in areas where deer damage was occurring. Between 1990 and 1995, significant deer season liberalizations were implemented and the use of antlerless tags was expanded greatly. While the deer harvest continued to increase, the percentage of does in the harvest still did not exceed 40% (Figure 3). By 1995, damage complaints had reached an all time high. In an effort to harvest more female deer, the Division changed the 1996 license deer tag structure from 2 either sex tags to 1 antlerless only tag and 1 hunter's choice tag. In that same year, the December antlerless season was expanded from 2, to 6 days. To further promote the harvest of female deer, free antlerless deer damage tags were made available to farmers having documented deer damage and enrolled in the DDAP. These measures resulted in a statewide harvest consisting of 50% female deer. In 2002, the license deer tags were converted to two antlerless tags. To harvest an antlered buck, hunters had to purchase a hunter's choice tag.

To further promote the harvest of female deer, the Division also altered its deer season structure. In 2004, 8 additional antlerless gun days were added in October and 2 doe tags were added to the hunting license. Due to continuous complaints regarding crop damage from deer, in late August 2006 the Division created the Severe Deer Damage Assistance Program (SDDAP). Those enrolled in this program are allowed to harvest antlerless deer from August 15 through May 15. Past experience has shown that the use of antlerless deer damage tags within the original DDAP, have been effective in increasing the number of does in the total harvests.

The percentage of does in the 2010/11 harvest was 53.5% statewide, similar to the 2009/10 harvest (Figure 3). The 2001/02 season was the first season in which more female deer were harvested than males with the percentage of females in the total harvest peaking during the 2004/05 season, in which nearly 58% of the harvest were females. Since then, the percentage of does has slowly decreased but has still remained above 50%. This decline while be monitored and evaluated over the coming seasons, as will sex ratio data on a zone basis, with regulations being reviewed and adjusted as needed in response to management goals.

Road Kill and Disease Surveillance

Along with hunter harvest mortality, the Division monitors other sources of mortality (e.g. vehicle collisions and disease). Deer that have been struck but an automobile may be legally possessed provided an individual obtains a Vehicle Killed Deer Tag which are provided by the Division to state, county, or city enforcement officers for issuance. During this segment, 77 of these tags were provided to Delaware motorists. Additionally, the Delaware Department of Transportation (DelDOT) keeps track of the total number as well as the gender of each deer killed by an automobile and removed from a primary Delaware roadway. In 2010, 951 deer were removed by DelDOT, with the largest proportion being comprised of adult does (Table 3).

Regarding deer disease, Epizootic Hemorrhagic Disease (EHD) is annually the most common disease that impacts the Delaware deer population, even then, the impacts are minimal. Last year was a mild to normal year concerning EHD outbreaks in Delaware as the conditions were not ideal for an outbreak to occur. Delaware tends to have outbreak problems during dry summers proceeded by a mild winter. These conditions were not present in 2010 and as a result only 24 deer were reported during this segment to the Division in which the likely cause of death was EHD, i.e., deer was found dead in late summer, near water, which is very typical of our EHD cases. Of the 24 deer reported, 17 were in the same area (Townsend, DE, Deer Management Zone 3) so most of our reported cases were confined to a small geographic area which is typical of this disease. During the 2010/11 season, Division personnel collected CWD samples at deer processors during the November and January Shotgun Seasons. A few samples were also collected from animals that exhibited symptoms of CWD throughout the year. In total, 584 samples were collected and all tested negative for the presence of CWD prions.

RECOMMENDATIONS:

This job should be continued. The annual deer harvest continues to remain high, as have deer damage complaints in some areas of the state, although the deer population seems to have begun to decline. Continuous monitoring is essential for sound management of the herd.

PREPARED BY:

Joe Rogerson
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REVIEWED BY:

Rob Hossler
Program Manager – Game Species

Table 1. The total number of white-tailed deer harvested within each of the 18 Delaware Deer Management Zones during the 2009/10 and 2010/11 seasons and the difference between two.

Deer Management Zone	2009/10 Season	2010/11 Season	Difference	Percent Change
1A	N/A	1007	N/A	N/A
1B	N/A	238	N/A	N/A
Zone 1A and 1B Combined	1360	1245	-115	-8.5%
2	645	752	107	16.6%
3	582	590	8	1.4%
4	484	569	85	17.6%
5	629	655	26	4.1%
6	749	809	60	8.0%
7	1068	1192	124	11.6%
8	569	695	126	22.1%
9	767	881	114	14.9%
10	463	526	63	13.6%
11	1094	1316	222	20.3%
12	707	1041	334	47.2%
13	553	669	116	21.0%
14	609	868	259	42.5%
15	670	802	132	19.7%
16	837	1023	186	22.2%
17	405	550	145	35.8%
Unknown[1]	209	0		
Total	**12400**	**14183**	**1992**	**16.1%**

[1]Consists of deer that were harvested and the deer management zone was not indicated.

Table 2. The total number of white-tailed deer harvested on each of the areas open to public hunting during the 2010/11 season.

Public Area	Total Harvest
National Wildlife Refuges	
Bombay Hook NWR	63
Prime Hook NWR	82
State Forests	
Blackbird SF	142
Redden SF	223
Taber SF	33
County & State Parks	
Brandywine Creek SP	17
Cape Henlopen SP	35
Delaware Seashore SP	23
Fort Delaware SP	8
Fort DuPont SP	0
Holts Landing SP	3
Killen Pond SP	9
Lums Pond SP	29
Trap Pond SP	41
White Clay Creek SP	117
Industrial Forest Lands	
Industrial Forest Lands	26
Wildlife Areas	
Assawoman WA	69
Augustine WA	45
Blackbird Reserve WA	6
Blackiston WA	24
C&D Canal WA	104
Cedar Swamp WA	27
Little Creek WA	32
Marshy Hope WA	9
McGinnis Pond WA	1
Midlands WA	61
Milford Neck WA	64
Nanticoke WA	40
Norman G. Wilder WA	71
Old Furnace WA	41
Prime Hook WA	27
Ted Harvey WA	26
Urban/Fortney Tracts	1
Woodland Beach WA	30
Unknown	**390**
Total	**1,919**

Table 3. The total number deer, separated by gender and age, of white-tailed deer removed from primary and secondary roads in Delaware by the Delaware Department of Transportation each month in 2010.

	Adult Doe	Fawn Doe	Button Buck	Spike Buck with Both Antlers < 3"	Antlered Buck	Shed Buck	Unknown	Monthly Total
January	33	4	7	0	6	1	11	62
February	7	0	1	0	0	0	0	8
March	44	4	1	0	9	1	10	69
April	29	6	2	0	9	1	7	54
May	40	19	12	0	9	4	19	103
June	36	9	5	0	5	2	21	78
July	33	8	4	0	11	0	3	59
August	21	7	2	0	12	0	7	49
September	26	6	3	0	12	0	11	58
October	60	5	8	0	46	0	15	134
November	81	17	9	0	67	1	22	197
December	37	7	4	0	11	0	21	80
Total	**447**	**92**	**58**	**0**	**197**	**10**	**147**	**951**

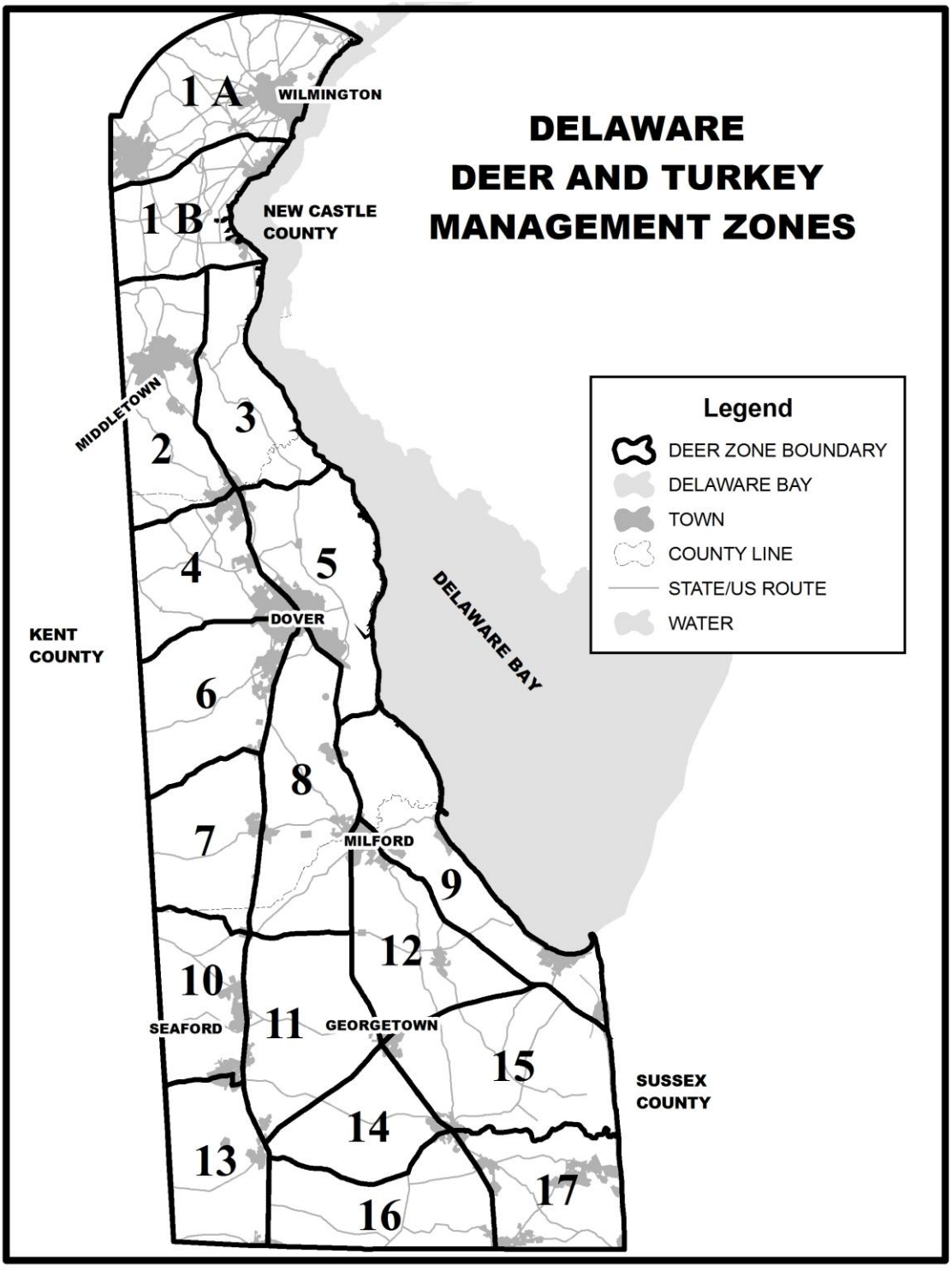

Figure 1. Map outlining the boundaries of the 18 White-tailed Deer Management Zones within Delaware.

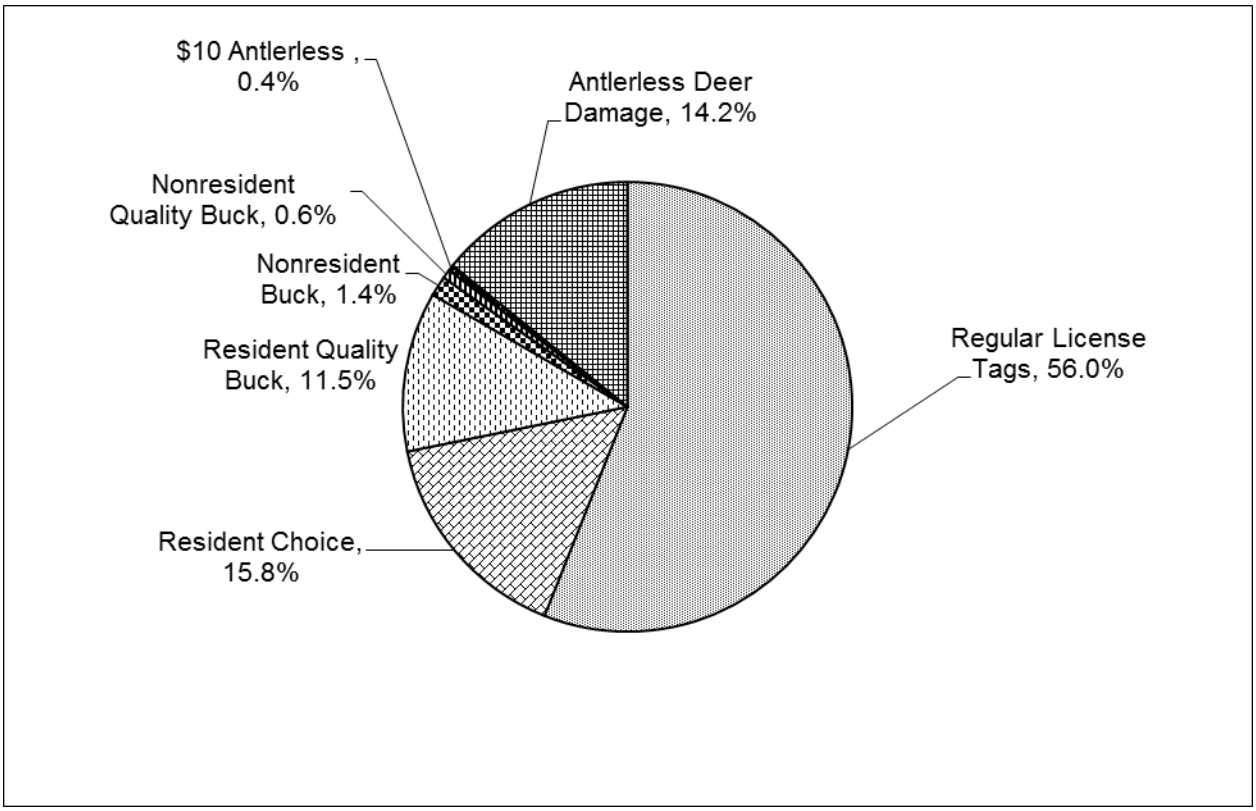

Figure 2. The percentage of special deer tags compared to regular license tags used by Delaware hunters during the 2010/11 deer hunting season. Special tags are comprised of hunter's choice tags, quality buck tags, non-resident buck, $10 additional antlerless deer tags, and antlerless deer damage tags.

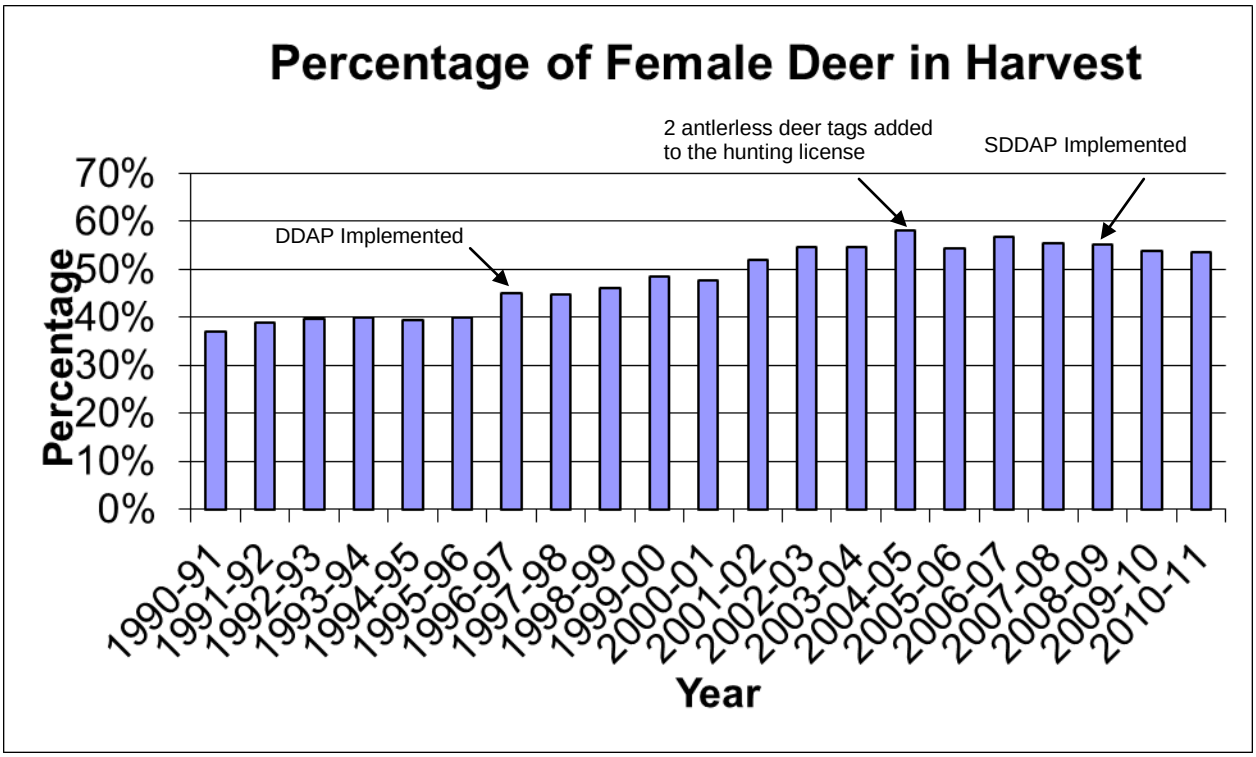

Figure 3. The percentage of female white-tailed deer in Delaware's total harvest from 1990/91 through the 2010/11 season.

STATE: Delaware

GRANT NUMBER AND TITLE:

W 35R – Wildlife Investigations: White-tailed Deer

OBJECTIVE:

To maintain a healthy and viable deer herd and minimize human/deer conflicts

JOB NUMBER AND TITLE:

Job 2 – White-Tailed Deer Population Ecology Monitoring and Evaluation.

JOB OBJECTIVE:

To determine white-tailed deer population size, demographics (i.e. bucks/doe, fawns/doe), antler cycles, survival, movement rates, and environmental impacts.

ACTIVITY:

Deer Movement and Survival Research:

On hundred and twelve deer were captured using a variety of methods (1 deer in a Clover trap, 6 deer via dart gun, and 105 deer under drop nets) during 14 December 2009 – 6 May 2010 and 10 December 2010 – 15 April 2011. All captured deer received ear tags and 44 adult females were equipped with radio collars. Sources of 17 mortalities were documented (2 capture myopathy, 1 natural mortality, 3 vehicle collisions, 9 harvest related mortalities, and 2 unknown mortalities). We also collected 9,736 telemetry locations (5,161 daytime, 4,575 nighttime) for 42 of the adult female deer from 1 May 2010 through 30 September 2011.

Antler Shedding Study

In Delaware, there are three weeklong firearms seasons during the month of January. In early January, there is a weeklong handguns season followed by a one week shotgun season and finally a one week muzzleoader season during the last week of the month. Additionally, farms enrolled in the Severe Deer Damage Assistance Program are able to harvest antlerless deer until May 15th. With ample opportunities for hunters to use firearms to harvest deer in the winter, there was concern that many hunters may be mistaking bucks that had shed both antlers for does when they shot a deer. Because of this concern a study was designed to determine when peak antler shedding occurred in Delaware. In early January 2011, nine sites were selected across the state, three sites in each county. Sites were baited with shelled corn twice a week and each site was monitored with a Reconyx infrared camera until late February.

Deer Sighting and Hunter Effort Survey:

Prior to the opening of the 2010/11 hunting season (September 1st), 2,000 hunters were randomly selected from the 2009/10 hunting license database and each received a season-long deer sighting survey. Hunters were asked to keep track of the number of deer they saw and/or harvested, as well as the number of hours they hunted each day of the season. Additionally, they were asked to indicate the county, deer management zone, and land type (public or private) they

hunted in each day. This information will be useful in compiling a deer sighting index across the state and would allow us to compare various areas (counties, deer management zones).

TARGET DATE:

September 30, 2011

STATUS:

On schedule

REMARKS:

Deer Movement and Survival Research:

We were unable to reach our goal of 30 radio collared adult females for the second trapping season because deer were more hesitant to go under drop nets the second trapping season. During the crop season (1 May – 31 August) we collected approximately 40 telemetry locations per month on each deer. And we anticipate collecting similar information throughout the hunting season (October - January 2012).

We used the fixed kernel method and the least-square cross validation (LSCV) as a smoothing parameter for estimating 95% home ranges and 50% core areas. Average home range size during the crop season (1 May – 31 August) was 134.5 ha (±14.8) with an average core area size of 31.5 ha (±3.9). The average crop season daytime home range size was 137.9 ha (±16.0) with an average core area size of 32.8 ha (±4.1). The average crop season nighttime home range was 137.8 ha (±20.8) with an average core area size was of 33.3 ha (±5.7). Average home range size during the hunting season (1 October – 31 January) was 126.8 ha (±15.0) with an average core area size of 26.1 ha (±3.5). The average hunting season daytime home range size was 128.9 ha (±20.2) and with an average core area size of 27.5 ha (±4.7). The average hunting season nighttime home range size was 131.9 ha (±17.4) with an average core area size of 29.7 ha (±3).

Antler Shedding Study

During the nearly month and a half of the survey over 650,000 images were obtained. As a result of the numerous pictures obtained, we have not analyzed the data from this project and are in the process of deciding how to handle this voluminous amount of data. Preliminary results indicate very few deer shed their antlers during the month of January and most do not begin to shed their antlers until mid to late February; therefore, hunters mistaking shed antlered bucks for antlerless deer should not be a problem during Delaware's various January hunting season.

Deer Sighting and Hunter Effort Survey:

Of the 2,000 hunters to receive a survey, only 250 hunters returned a usable survey, a 12.5% return rate, even though hunters were mailed a postcard each month of the season, reminding them to complete their survey. As a result, insufficient data was collected at the deer management zone level to make significant comparisons so county level data was the smallest spatial scale analyzed. Survey methodology and design will need to be critically evaluated and altered if this type of information is to be collected in the future.

Daily hunter effort was relatively consistent among each of the three counties with the average hunter hunting a little over 4 hours/day (Table 1). The number of hours per antlerless deer observed was relatively constant among counties, approximately 2.0 hours hunted per antlerless deer seen (Table 2). The average number of hours spent afield before a hunter saw a buck ranged between 7.8 and 10.0, depending on the county (Table 2). Hunters harvested an antlerless deer on average twice as frequently as they did an antlered deer (Table 2).

Included in this survey, was a question that attempted to determine the percentage of hunters that archery hunted during the deer season (30.6%) and the equipment they used. Results indicated that 27.2% of hunters used a compound bow, 6.4% a crossbow, 2.0% a recurve bow, and 0.8% used a longbow (some hunters used more than one type of archery equipment during the season).

RECOMMENDATIONS:

This job should be continued

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REVIEWED BY:

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Delaware Division of Fish & Wildlife

Table 1. Hunting Effort of deer hunters (n=250) within each of Delaware's three counties during the 2010/11 hunting season.

County	Days Hunted	Hours Hunted	Avg Hours Per Day	Median Hours Per Day	Minimum Hours Per Day	Maximum Hours Per Day
New Castle	812	3498	4.3	4	0.5	12
Kent	955	3933	4.1	3.5	0.25	12
Sussex	1388	5792	4.2	3.5	0.5	14

Table 2. Number of hours Delaware deer hunters (n=250) hunted per antlerless and antlered deer observed and harvested during the 2010/11 hunting season.

County	Days Hunted	Hours Hunted	Hours Per Antlerless Observed	Hours Per Antlerled Observed	Hours Per Unknown Observed	Hours Per Antlerless Harvested	Hours Per Antlerled Harvested
New Castle	812	3498	1.9	7.8	22.4	68.6	112.8
Kent	955	3933	2.3	10.0	16.9	49.2	140.5
Sussex	1388	5792	2.0	9.8	20.5	49.1	107.3

STATE: Delaware

GRANT NUMBER AND TITLE:

W 35R – Wildlife Investigations: White-tailed Deer

JOB NUMBER AND TITLE:

Job 3. White-tailed Deer Management Plan

JOB OBJECTIVES:

Create a formal plan related to deer management in Delaware. This plan will serve as the guiding document into "how" and "why" deer are managed in Delaware. We will utilize harvest data, population data, and feedback from various stakeholder groups to formulate objectives and goals that will direct the Division's efforts related to deer management.

ACTIVITY:

No activity. This job was completed during the previous segment

TARGET DATE:

September 30, 2011

STATUS:

Completed

REMARKS:

Previously, a formal deer management plan did not exist for Delaware. That's not to say the Division didn't have a "plan" concerning deer management but the goals and objectives were never clearly defined in a written context. After numerous stakeholder and public meeting, the Division created a plan to direct its efforts concerning deer management over the next ten years, through the year 2019.

RECOMMENDATIONS:

This job has been completed.

PREPARED BY:

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REVIEWED BY:

Rob Hossler
Program Manager – Game Species

STATE: Delaware

GRANT NUMBER AND TITLE:

W 35 R – Wildlife Investigations: White-tailed Deer

OBJECTIVE:

To maintain a healthy and viable deer herd and minimize human/deer conflicts.

JOB NUMBER AND TITLE:

Job 4. White-tailed Deer Density Impacts

JOB OBJECTIVES:

To determine the ecological carrying capacity and impacts associated with different deer densities within varying habitats in Delaware and to determine the deer densities needed to maintain forest regeneration and plant species diversity.

ACTIVITY:

During this grant period, very limited activity was conducted on this objective due to staff limitations and assignment changes. There were discussions on coordinating these activities in association with future handheld and aerial infrared population surveys.

TARGET DATE:

September 30, 2011

STATUS:

To be revisited to determine schedule for completion.

REMARKS:

The aerial survey technique used by the Division for estimating deer density has sufficient variability to exclude its use for smaller more defined areas in which exclosures will be constructed and habitat impacts evaluated. Therefore exclosures will be constructed in deer management zones with the least amount of annual variability (coefficient of variation) associated with hunter harvest, the largest source of population change. Several spotlight surveys of a defined area surrounding each exclosure will be conducted during the late-winter to determine the minimum deer density.

RECOMMENDATIONS:

This job should be continued as a cornerstone of the Division's deer management efforts consists of developing ecological carrying capacity estimates; however, sufficient staff time needs to be found to adequately devote to it.

PREPARED BY:

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